MILITARY SPECIFICATION

COILS, FIXED RADIOFREQUENCY, MOLDED, ESTABLISHED RELIABILITY GENERAL SPECIFICATION FOR

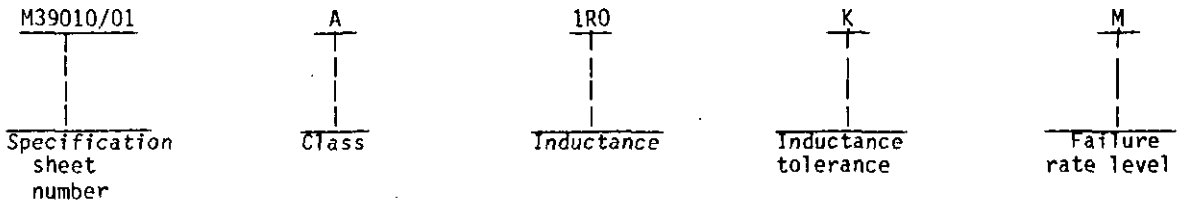
This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for established reliability fixed, radiofrequency, molded coils which are resistant to immersion and moisture. Radio frequency coils meeting the requirements specified herein have failure rate levels ranging from 1.0 percent per 1,000 hours to 0.001 percent per 1,000 hours which are established at a 60 percent confidence level (see 1.2.1.4). The failure rate level identified by the applicable symbol specified in table III is referred to operation at full load cyclic condition at the specified ambient temperature (see 3.1 and 6.2).

1.2 Classification.

1.2.1 Military part number. The military part number shall consist of the letter M, the basic number of the specification sheet, and a dash number (see 3.1) as shown in the following example:



1.2.1.1 Class. The classes of coils denoting the maximum operating temperatures (see 3.1) are identified by a single letter in accordance with table I.

TABLE I. Maximum operating temperature.

Class	Temperature
	°C
A	105
B	125
F	150

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Electronics Research and Development Command, ATTN: DELET-R-S, Fort Monmouth, NJ 07703, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

1.2.1.2 Inductance. The nominal inductance value expressed in microhenries (μH) is identified by three symbols in accordance with the following:

Nominal inductance values less than 10 μH are identified with two numbers representing the significant figures and the letter (R) designating decimal point location.

Example: 0.12 μH = R12
1.2 μH = 1R2

Nominal inductance values of 10 μH and greater are identified by a 3-digit number. The first two digits represent significant figures, and the last digit specifies the number of zeroes to follow.

1.2.1.3 Inductance tolerance. The inductance tolerance is identified by a single letter in accordance with table II.

TABLE II. Inductance tolerance.

Symbol	Tolerance
	percent
J - - - - -	± 5
K - - - - -	± 10
L - - - - -	± 20

1.2.1.4 Failure-rate-level designation. The specified failure rate level per 1,000 hours at the 60 percent consumer's confidence level and maintained at a 10 percent producer's risk is identified by a single letter in accordance with table III and as described in MIL-STD-690.

TABLE III. Failure rate level (established at a 60 percent confidence level).

Symbol	Failure rate level (percent/1,000 hours)
M - - - -	1.0
P - - - -	0.1
R - - - -	0.01
S - - - -	0.001

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

J-W-1177 - Wire, Magnet, Electrical.
QQ-S-571 - Solder, Tin Alloy: Tin-lead Alloy; and Lead Alloy.
QQ-S-781 - Strapping, Steel, and Seals.
PPP-B-566 - Box, Folding, Paperboard.
PPP-B-585 - Boxes, Wood, Wirebound.
PPP-B-601 - Boxes, Wood, Cleated-Plywood.
PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636 - Boxes, Shipping, Fiberboard.
PPP-B-676 - Boxes, Setup.

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MIL-P-116 - Preservation, Methods of.
MIL-F-14256 - Flux, Soldering, Liquid (Rosin Base).

(See supplement 1 for list of associated specifications)

STANDARDS

FEDERAL

FED-STD-H28 - Screw-Thread Standards for Federal Services.

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
MIL-STD-454 - Standard General Requirements for Electronic Equipment.
MIL-STD-690 - Failure Rate Sampling Plans and Procedures.
MIL-STD-790 - Reliability Assurance Program for Electronic Parts Specifications.
MIL-STD-810 - Environmental Test Methods.
MIL-STD-1188 - Commercial Packaging of Supplies and Equipment.
MIL-STD-1276 - Leads for Electronic Component Parts.
MIL-STD-1285 - Marking of Electrical and Electronic Parts.
MIL-STD-45662 - Calibration Systems Requirements.

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Specification sheets. The individual items requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this specification and the specification sheets, the latter shall govern (see 6.2).

3.2 Qualification. Coils furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.5 and 6.3). In addition, the manufacturer shall obtain certification from the qualifying activity that the reliability assurance program requirements of 4.1 have been met and are being maintained for ER coils.

3.3 Reliability. Reliability of coils furnished under this specification shall be established and maintained in accordance with the procedures and requirements specified in MIL-STD-790 and MIL-STD-690 with details and exceptions specified in 4.1.1, 4.4.4, 4.5, and 4.6.2.1.1.

3.4 Material. The material for each part shall be as specified herein; however, when a definite material is not specified, a material shall be used which will enable the coils to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be constructed as a guaranty of the acceptance of the finished product.

3.4.1 Substitution of material. If the supplier desires to substitute another material for a specified material or fabricated part, he shall submit a statement to the Government describing the proposed substitution, together with evidence to substantiate his claims that such substitute is suitable. At the discretion of the Government, test samples may be required to prove the suitability of the proposed substitute. Before such substitutions are made, approval for each substitution shall be obtained in writing from the Government.

3.4.2 Flammable materials. So far as practicable, materials used in the construction of coils shall be nonflammable and nonexplosive.

3.4.3 Corrosive materials. Corrosive materials used in any of the manufacturing processes shall be removed or neutralized so that no corrosion will result from their use. So far as practicable, materials used in the construction of coils shall be noncorrosive.

3.4.4 Wire.

3.4.4.1 Magnet wire. Magnet wire shall conform to J-W-1177. When types and sizes of magnet wire not covered in J-W-1177 are essential in a winding design, other wire may be used with the approval of the Government.

3.4.5 Solder and soldering flux. Solder shall be in accordance with QQ-S-571, type Sn60 or Sn63 and the flux core solder shall be type R or RMA. Flux shall be in accordance with MIL-F-14256, type R or RMA.

3.5 Design and construction. Coils shall be of the design, construction, and physical dimensions specified (see 3.1 and 6.1).

3.5.1 Threaded parts. Unless otherwise specified (see 3.1), all threaded parts shall be in accordance with FED-STD-H28.

3.5.1.1 Engagement of threaded parts. Unless otherwise specified (see 3.1), all threaded parts shall engage at least three full threads.

3.5.2 Terminals. Terminals shall be of the shape and physical dimensions specified (see 3.1 and 6.1).

3.5.2.1 Solderable/weldable lead terminals. Unless otherwise specified, the manufacturer shall verify by certification that all leads conform to type LW(---)C3N per MIL-STD-1276.

3.5.2.2 Winding ends. The ends and end turns of layer-wound coils and the finish-turns of universal-wound coils shall be secured in such a manner as to anchor them securely in place. The length of leads from windings shall be as short as practicable, and when necessary, shall be supported to prevent vibration. The termination of element to terminal shall not depend on solder or welding alone to attain mechanical strength.

3.5.3 Weight. Coils shall not exceed the weight specified (see 3.1).

3.6 Thermal shock. After coils are tested as specified in 4.7.2, all windings shall be electrically continuous; there shall be no dielectric breakdown nor impairment of protective coatings; and the insulation resistance shall be as specified in 3.10.

3.7 Electrical characteristics. The electrical characteristics shall be as specified (see 3.1 and 4.7.3).

3.7.1 Inductance. When coils are tested as specified in 4.7.3.1, the inductance shall be as specified (see 3.1 and 6.1).

3.7.2 Q of coils. When coils are tested as specified in 4.7.3.2, the Q shall be as specified (see 3.1).

3.7.3 Self-resonant frequency. When coils are tested as specified in 4.7.3.3, the self-resonant frequency shall be not less than the minimum value specified (see 3.1).

3.7.4 Percent coupling. When coils are tested as specified in 4.7.3.4 or 4.7.3.4.1, the percent coupling shall be as specified (see 3.1).

3.7.5 Incremental current inductance change. When coils are tested as specified in 4.7.3.5, inductance value shall represent a change of 5 percent or less of the inductance measured with zero dc current (see 3.1).

3.7.6 Effective parallel resistance. When coils are tested as specified in 4.7.3.6, the effective parallel resistance shall be as specified (see 3.1).

3.7.7 DC resistance. When coils are tested as specified in 4.7.3.7, the dc resistance shall be as specified (see 3.1).

3.8 Dielectric withstanding voltage. When coils are tested as specified in 4.7.4, there shall be no arcing, flashover, breakdown, nor other damage, and the leakage current shall not exceed 100 microamperes.

3.9 Barometric pressure (when applicable). When coils are tested as specified in 4.7.5, there shall be no arcing, breakdown, flashover, nor other damage, and the leakage current shall not exceed 100 microamperes.

3.10 Insulation resistance. When measured as specified in 4.7.6, the insulation resistance shall be not less than 1,000 megohms.

3.11 Winding continuity (when applicable). When coils are tested as specified in 4.7.7, all windings shall be electrically continuous.

3.12 Temperature rise. When coils are tested as specified in 4.7.8 or 4.7.8.1, the temperature rise of any winding above the specified maximum ambient temperature (see 3.1), shall not exceed the value specified (see 3.1), and there shall be no evidence of physical damage.

3.13 Overload. When coils are tested as specified in 4.7.9, there shall be no evidence of cracked cases, no loosening of the terminals or other mechanical damage.

3.14 Resistance to soldering heat. When coils are tested as specified in 4.7.10, there shall be no evidence of mechanical damage nor loosening of the terminals.

3.15 Terminal strength. When coils are tested as specified in 4.7.11, there shall be no winding discontinuity, no loosening or rupturing of the terminals, nor other mechanical damage.

3.16 Solderability. When coils are tested as specified in 4.7.12, they shall meet the applicable criteria for termination in method 208 of MIL-STD-202 and electrical connections shall be mechanically secure before soldering, and electrically continuous after soldering.

3.17 Resistance to solvents. When coils are tested as specified in 4.7.13, there shall be no evidence of mechanical damage and the marking shall remain legible.

3.18 Flammability. When coils are tested as specified in 4.7.14, there shall be no evidence of violent burning which results in an explosive-type fire, and the coating material used on the coils shall be self-extinguishing (see 6.4). A coil shall not be considered to have failed in the event that it is consumed by the applied flame. A coil shall be considered to have failed only if an explosion or dripping of flaming material occurs, an explosive-type flame is produced, or if visible burning continues beyond the allowable duration of 3 minutes after removal of the applied flame.

3.19 Low-temperature storage. When coils are tested as specified in 4.7.15, there shall be no impairment of protective coating, no loosening of the windings or terminals, nor any other evidence of mechanical damage.

3.20 Vibration. When coils are tested as specified in 4.7.16.1 or 4.7.16.2, there shall be no winding discontinuity (see 3.11), nor evidence of physical or mechanical damage.

3.21 Shock (specified pulse). When coils are tested as specified in 4.7.17, there shall be no winding discontinuity (see 3.11), nor evidence of physical or mechanical damage.

3.22 Immersion. When coils are tested as specified in 4.7.18, there shall be no winding discontinuity, no evidence of corrosion, nor other visible damage. There shall be no dielectric breakdown, and the insulation resistance shall be as specified in 3.10.

3.23 Moisture resistance. When coils are tested as specified in 4.7.19, the dielectric withstanding voltage shall meet the requirements specified in 3.8, the insulation resistance shall be as specified in 3.10, the electrical characteristics shall be as specified in 3.7, and there shall be no evidence of corrosion affecting the mechanical or electrical operation.

3.24 Life.

3.24.1 Qualification inspection. When coils are tested as specified in 4.7.20, there shall be no evidence of mechanical damage. The change in electrical characteristics between the initial measurements and 250 +48, -0 hours shall not exceed the initial limits specified for phenolic and iron core coils, and the electrical characteristics from the 250 +48, -0 hours up to and including 2,000 hours shall not exceed the degradation limits specified (see 3.1). The change in electrical characteristics for ferrite core coils between the initial measurements up to and including 2,000 hours shall not exceed the degradation limits specified (see 3.1).

3.24.2 Failure rate level determination (extended FR test). When coils are tested as specified in 4.7.20, the change in inductance and Q between the initial measurement and any succeeding measurement up to and including 10,000 +96, -0 hours shall not exceed the limits specified (see 3.1). This single failure criteria shall be applicable to all measurements during the life test for purpose of determining failure rate level qualifications.

3.25 Fungus. Materials used in the construction of coils shall be fungus inert in accordance with requirement 4 of MIL-STD-454 (see 4.7.21).

3.26 Marking. Marking shall be in accordance with method I of MIL-STD-1285. Unless otherwise specified (see 3.1), coils shall be marked with the military part number, manufacturer's source code, JAN marking, date code, and lot symbol as shown in the following example. The marking shall remain legible after all tests (see 6.2).

Example:	M39010/ 01A1ROKM	Military part number
	12345	Manufacturer's source code
	JAN 7233A	JAN marking, date code, and lot symbol

At the option of the manufacturer, three lines may be used for the military part number. In this event the divisions shall be as specified in the following example:

Example:	M39010 /01A 1ROKM	Military part number
	12345	Manufacturer's source code
	J7233A	JAN marking, date code, and lot symbol

3.26.1 JAN and J marking. The United States Government has adopted, and is exercising legitimate control over the certification marks "JAN" and "J", respectively, to indicate that items so marked or identified are manufactured to, and meet all the requirements of military specifications. Accordingly, items procured to, and meeting all of the criteria specified herein and in applicable detail specifications shall bear the certification mark "JAN" except that items too small to bear the certification mark "JAN" shall bear the letter "J". The "JAN" or "J" shall be placed immediately before the part number except that if such location would place a hardship on the manufacturer in connection with such marking, the "JAN" or "J" may be located on the first line above or below the part number. Items furnished under contracts or orders which either permit or require deviation from the conditions or requirements specified herein or in applicable detail specifications shall not bear "JAN" or "J". In the event an item fails to meet the requirements of this specification and the applicable specification sheets or detail specifications, the manufacturer shall remove the "JAN" or the "J" from the sample tested and also from all items represented by the sample. The "JAN" or "J" certification mark shall not be used on products procured to contractor drawings or specifications. The United States Government has obtained Certificate of Registration No. 504,860 for the certification mark "JAN".

3.26.2 Supplying to higher FR levels. A manufacturer may supply to a higher FR level than that to which he is qualified. Parts qualified and marked to lower FR levels are substitutable for higher FR level parts, and shall not be remarked unless specified in the contract or purchase order (see 6.2).

3.27 Workmanship. Coils shall be processed in such a manner as to be uniform in quality and free of defects that will affect life, serviceability, or appearance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure suppliers and services conform to prescribed requirements.

4.1.1 Reliability assurance program. A reliability assurance program shall be established and maintained in accordance with MIL-STD-790. Evidence of such compliance shall be verified by the qualifying activity of this specification as a prerequisite for qualification and continued qualification.

4.1.2 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the inspection facility. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-STD-45662.

4.2 Classification of inspections. The inspection requirements specified herein shall be classified as follows:

a. Qualification inspection (see 4.4).

b. Verification of qualification (see 4.5).

c. Quality conformance inspection (see 4.6).

4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions as specified in the "General Requirements" of MIL-STD-202.

4.3.1 Test voltage. The test voltage shall contain no more than 5 percent harmonic distortion.

4.3.2 Test frequency. When a test frequency is specified without a tolerance, the frequency used shall be written 0.1 percent of the specified value.

4.3.3 Demagnetization. When necessary to overcome remanence effects, demagnetization is permitted.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.4.1 Sample size. The number of sample units comprising a sample of coils to be submitted for qualification inspection shall be as specified in the appendix to this specification, and table IV.

4.4.2 Test routine. Sample units shall be subjected to the qualification inspection specified in table IV in the order shown. All sample units except group III, shall be subjected to the inspection of group I. The sample units shall then be divided as specified in table IV for groups II to VI inclusive, and subjected to the inspection for their particular group.

4.4.3 Failures. Failures in excess of those allowed in table IV shall be cause for refusal to grant qualification approval.

4.4.4 Failure rate (FR) qualification. Failure rate qualification shall be in accordance with the general and detailed requirements of MIL-STD-690 with the following details:

a. Procedure I - Qualification at the initial FR level. Level M (1 percent/1,000 hours) of FRSP-60 shall apply. Sample units shall be subjected to the qualification inspection specified in group V, table IV. The entire life test sample shall be continued on test to 10,000 hours as specified in 4.7.20 upon completion of the 2,000 hour qualification.

b. Procedure II - Extension of qualification to lower FR levels. To extend qualification to the R (0.01 percent) and S (0.001 percent) FR levels, data from two or more classes of same core material may be combined.

c. Procedure III - Maintenance of FR level qualification. Maintenance period B of FRSP-10 shall apply. Regardless of the number of production lots produced during this period, the specified number of unit hours shall be accumulated to maintain qualification (see 4.6.2.1.1). For FR levels R and S data from all classes may be combined.

4.5 Verification of qualification. Every six months the manufacturer shall compile a summary of the results of quality conformance inspections and, where applicable, extended FR test data, in the form of a verification of qualification report, and forward it to the qualifying activity as the basis of continued qualification approval. In addition to the periodic submission of FR test data, the manufacturer shall immediately notify the qualifying activity whenever the FR data indicates that the manufacturer has failed to maintain his qualified FR level. Continuation shall be based on evidence that, over the six month period, the following has been met:

a. Verification by the qualifying activity that the manufacturer meets the requirements of MIL-STD-790.

b. The manufacturer has not modified the design of the item.

c. The specification requirements for the item have not been amended so as to affect the character of the item.

d. Lot rejection for groups A or B does not exceed 1 percent or one lot, whichever is greater.

e. Requirements for group C inspection are met.

f. The records of all FR tests combined substantiate that the M (1.0 percent) or P (0.1 percent) FR levels have been maintained or that the manufacturer continues to meet the R (0.01 percent), or S (0.001 percent) FR level for which qualified, although the total component hours of testing does not, as yet, meet the requirements of 4.4.4c.

If group C requirements were not met and the manufacturer has taken corrective action satisfactory to the Government, the fowarding of the verification of qualification report may be delayed until within 30 days after completion of retesting of the periodic quality conformance tests. In this case, the qualifying activity shall be notified on this condition within the time that the original verification of qualification report was due. All reports shall be certified by a responsible company official and the Government inspector. The qualifying activity shall be contacted for the report format.

TABLE IV. Qualification inspection.

Inspection	Requirement paragraph	Method paragraph	Number of 1/ sample units to be inspected	Number of defectives allowed
Group IA (screening test)				
Thermal shock	3.6	4.7.2	All units (except group III)	Not applicable
Electrical characteristics (initial)	3.7	4.7.3		
Inductance	3.7.1	4.7.3.1		
Q	3.7.2	4.7.3.2		
Self-resonant frequency	3.7.3	4.7.3.3		
DC resistance	3.7.7	4.7.3.7		
Group IB				
Other electrical characteristics (see 3.1) (initial): Percent coupling	3.7.4	4.7.3.4 or 4.7.3.4.1	All units (except group III)	0
Incremental current inductance change (when specified)	3.7.5	4.7.3.5		
Effective parallel resistance (when specified)	3.7.6	4.7.3.6		
Visual and mechanical inspection (external)	3.1, 3.4 to 3.5.3 inclusive 3.26 and 3.27	4.7.1		
Group II				
Dielectric withstanding voltage	3.8	4.7.4	20	1
Barometric pressure	3.9	4.7.5		
Insulation resistance	3.10	4.7.6		
Temperature rise	3.12	4.7.8		
Overload 2/	3.13	4.7.9		
Resistance to soldering heat	3.14	4.7.10		
Terminal strength	3.15	4.7.11		
Electrical characteristics (final)	3.7	4.7.3		
Inductance	3.7.1	4.7.3.1		
Q	3.7.2	4.7.3.2		

See footnotes at end of table.

TABLE IV. Qualification inspection - Continued.

Inspection	Requirement paragraph	Method paragraph	Number of 1/ sample units to be inspected	Number of defectives allowed
Group III				
Solderability 3/ (6 units both leads) (12 units single leads)	3.16	4.7.12	6	0
Resistance to solvents 3/	3.17	4.7.13	4	
Flammability (use 3 units from solderability)	3.18	4.7.14	(3)	
Group IV				
Low temperature storage (-65°C)	3.19	4.7.15	20	1
Vibration	3.20	4.7.16		
Shock (specified pulse)	3.21	4.7.17		
Immersion	3.22	4.7.18		
Moisture resistance	3.23	4.7.19		
Electrical characteristic (final)	3.7	4.7.3		
Visual and mechanical inspection (external)	3.1, 3.4 to 3.5.3 inclusive 3.26 and 3.27	4.7.1		
Visual and mechanical inspection (internal) (Only 3 samples need be dissected)	3.1, 3.4 to 3.4.4.1 inclusive and 3.27	4.7.1		
Group V				
Life	3.24	4.7.20	102	1
Group VI				
Fungus 4/	3.25	4.7.21	10	0

1/ Combined submission will be in accordance with the appendix (see 30.1.2).
2/ After the overload test is performed, a period of 24 hours shall elapse prior to taking electrical characteristics (final) measurements.
3/ The units shall be clean units that have not been subjected to any other test.
4/ The fungus requirement is either by certification or performance.

4.6 Quality conformance inspection.

4.6.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspection.

4.6.1.1 Inspection lot. An inspection lot shall consist of all the coils of the same class and made of the same core material produced under essentially the same conditions, and offered for inspection at one time. The manufacturer may combine coils of different inductance values and inductance tolerances. The inductance value shall be equally representative of the product lot for that period.

4.6.1.2 Group A inspection. Group A inspection shall consist of the inspections specified in table V, in the order shown.

TABLE V. Group A inspection.

Inspection	Requirement paragraph	Method paragraph	LQ (limiting quality) and AQL	
Subgroup 1				
Thermal shock 1/	3.6	4.7.2		
Electrical characteristics 2/			100% inspection	
Inductance	3.7.1	4.7.3.1		
Q	3.7.2	4.7.3.2		
			Major	Minor
Subgroup 2				
Visual and mechanical (external)	3.1, 3.4, 3.5 through 3.5.2, 3.26 and 3.27	4.7.1	AQL=1.0% LQ=7.6%	AQL=4.0% LQ=18%
All remaining electrical characteristics (see 3.1) (initial)	3.7	4.7.3	3/ AQL=1.0% LQ=7.6%	

1/ Measurements after thermal shock specified in 4.7.2, not applicable.
2/ Coils shall meet the specified initial inductance and Q values.
3/ All electrical failures shall be considered major.

4.6.1.2.1 Sampling plan. Subgroup 1 tests shall be performed on each coil supplied under this specification. Only lots having not more than 5 percent rejects as a result of the subgroup 1 tests shall be furnished on orders. In addition, all coils of any given inductance value within the lot having a reject rate of more than 5 percent or more than one coil, whichever is greater shall be withdrawn from the lot and not furnished on orders. Corrective action shall be taken on such values and new pieces furnished. Statistical sampling and inspection for subgroup 2 shall be in accordance with MIL-STD-105 for general inspection level II. The acceptable quality level (AQL) and limiting quality (LQ) where P_a 10% shall be as specified in table V. At the option of the contractor, numerically lower AQL's may be used as long as the specified LQ is not exceeded numerically. Major and minor defects shall be as defined in MIL-STD-105.

4.6.1.2.1.1 Manufacturer's production inspection. If the manufacturer performs tests similar to those specified in subgroup 1, table V, as the final step of his production process, group A, subgroup 1 inspection may be waived and the data resulting from the manufacturer's production tests may be used instead. Authority to waive the subgroup 1 inspection shall be granted by the qualifying activity only. The following criteria must be complied with:

a. Tests conducted by the manufacturer during production shall be clearly identical to or more stringent than that specified for subgroup 1.

b. Manufacturer subjects 100 percent of the product supplied under this specification to his production tests.

c. The parameters measured and the failure criteria shall be the same or more stringent than those specified herein.

d. The lot rejection criteria is the same or more stringent than that specified herein.

e. The manufacturer shall make available all information concerning the test procedures and instrumentation used in his production test. This data shall be provided as part of the evaluation required for MIL-STD-790. The manufacturer shall also make available to the Government all records of all detail test data resulting from production tests.

4.6.1.2.2 Rejected lots. If an inspection lot is rejected, the manufacturer may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be kept separate from new lots, and shall be clearly identified as reinspected lots.

4.6.1.3 Group B inspection. Group B inspection shall consist of the inspections specified in table VI, in the order shown, and shall be made on sample units which have been subjected to and have passed group A inspection.

4.6.1.3.1 Sampling plan. The sampling plan shall be in accordance with MIL-STD-105 for special inspection level S-4. The AQL shall be 1.0 percent defective.

4.6.1.3.2 Rejected lots. If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

4.6.1.3.3 Disposition of sample units. Sample units which have passed all the group B inspection may be delivered on the contract or purchase order, if the lot is accepted and the sample units are still within specified electrical tolerances and meet the requirements for visual and mechanical inspection. The leads of these sample units shall also be clean, smooth and free from any foreign particles.

TABLE VI. Group B inspection.

Inspection	Requirement paragraph	Method paragraph	AQL (percent defective)
Dielectric withstanding voltage	3.8	4.7.4	AQL = 1.0
Barometric pressure	3.9	4.7.5	
Insulation resistance	3.10	4.7.6	
Electrical characteristics (initial)			
Inductance	3.7.1	4.7.3.1	
Q	3.7.2	4.7.3.2	

4.6.2 Periodic inspection. Periodic inspection shall consist of group C inspection. Except as specified in 4.6.2.1.3, delivery of products which have passed groups A and B inspection shall not be delayed pending the results of group C inspection.

4.6.2.1 Group C inspection. Group C inspection shall consist of the tests specified in table VII, in the order shown, and shall be performed on sample units of each class and core material and selected from lots that have passed groups A and B inspection.

4.6.2.1.1 Sampling plan.

4.6.2.1.1.1 Monthly (subgroup 1). Test samples shall be selected from each inspection lot produced during a one-month period. These samples shall be accumulated and placed on the life test as specified in 4.7.20, once a month, for the full 10,000-hour-life test period. The test sample size shall be determined by the manufacturer so that the unit hours generated meet the maintenance of qualification requirements specified for the qualified failure rate level (see 4.4.4). In any event a minimum of 10 samples shall be selected from each lot. As far as is practicable the inductance values tested during maintenance period shall be representative of the class and core material produced during this period. The accumulated data shall be used for maintenance and extension of failure rate qualification.

4.6.2.1.1.2 Quarterly (subgroup 2). Every 3 months, 10 sample units of any inductance value shall be subjected to subgroup 2 inspection; 6 units shall be used for solderability, 4 units for resistance to solvents and 3 of the 6 units subjected to solderability shall be used for flammability test.

4.6.2.1.1.3 Quarterly (subgroup 3). Every 3 months, 12 sample units of any inductance value shall be inspected.

4.6.2.1.1.4 Quarterly (subgroup 4). Every 3 months, 12 sample units of any inductance value shall be inspected.

4.6.2.1.2 Disposition of sample units. Sample units which have been subjected to group C inspection shall not be delivered on the contract or order.

4.6.2.1.3 Noncompliance. If a sample fails to pass group C inspection, the manufacturer shall notify the qualifying activity and the cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which are manufactured under essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity has been taken. After the corrective action has been taken group C inspection shall be repeated on additional sample units (all tests and examinations, or the test which the original sample failed, at the option of the qualifying activity). Groups A and B inspections may be reinstituted; however, final acceptance and shipment shall be withheld until the group C inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity and the qualifying activity.

4.6.3 Inspection of packaging. Except when industrial packaging is specified, the sampling and inspection of the preservation and interior package marking shall be in accordance with the groups A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification and the marking requirements of MIL-STD-129. The inspection of industrial packaging shall be as specified in the contract (see 6.2).

TABLE VII. Group C inspection.

Inspection	Requirement paragraph	Method paragraph	Number of sample units to be inspected	Number of defectives allowed
Subgroup 1 (Monthly)				
Life (extended)	3.24	4.7.20	(see 4.6.2.1.1.1)	
Subgroup 2 (Quarterly)				
Solderability (both leads)	3.16	4.7.12	10	0
Resistance to solvents	3.17	4.7.13		
Flammability	3.18	4.7.14		
Subgroup 3 (Quarterly)				
Electrical characteristics (initial)	3.7	4.7.3	12	1
Inductance	3.7.1	4.7.3.1		
Q	3.7.2	4.7.3.2		
Temperature rise	3.12	4.7.8		
Overload 1/	3.13	4.7.9		
Resistance to soldering heat	3.14	4.7.10		
Terminal strength	3.15	4.7.11		
Electrical characteristics (final)				
Inductance	3.7.1	4.7.3.1		
Q	3.7.2	4.7.3.2		
Subgroup 4 (Quarterly)				
Electrical characteristics (initial)	3.7	4.7.3	12	1
Low temperature storage	3.19	4.7.15		
Vibration	3.20	4.7.16		
Shock (specified pulse)	3.21	4.7.17		
Immersion	3.22	4.7.18		
Moisture reistance	3.23	4.7.19		
Electrical characteristics (final)	3.7	4.7.3		
Visual and mechanical inspection (internal) 2/	3.1, 3.4 to 3.4.4.1 inclusive and 3.27	4.7.1		

1/ After overload test is performed, a period of 24 hours shall elapse prior to taking electrical characteristics (final) measurements for ferrite core coils only.
2/ Only two sample units need to be dissected.

4.7 Methods of inspection.

4.7.1 Visual and mechanical inspection.

4.7.1.1 External. Coils shall be inspected to verify that the weight, materials, external design and construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements (see 3.1, 3.4 to 3.5.3 inclusive, 3.26, and 3.27).

4.7.1.2 Internal. Coils shall be dissected and inspected to verify that the materials, internal design, construction, and workmanship are in accordance with the applicable requirements (see 3.1, 3.4 to 3.4.4.1 inclusive, and 3.27).

4.7.2 Thermal shock (see 3.6). Coils shall be tested in accordance with method 107 of MIL-STD-202. The following details and exceptions shall apply:

a. Test condition A-1 (25 cycles). Step 3 shall be at the maximum temperature of the class.

b. Measurements after cycling. Winding continuity shall be determined, 90 percent of the dielectric withstanding voltage, and the insulation resistance as specified in 4.7.7, 4.7.4 and 4.7.6 respectively.

4.7.3 Electrical characteristics (see 3.1 and 3.7). The coils shall be mounted by their normal mounting means on their applicable test fixture. The electrical characteristics to be determined shall include inductance, Q, self-resonant frequency, and dc resistance. Additional electrical characteristics shall be measured when specified.

4.7.3.1 Inductance. Unless otherwise specified (see 3.1), effective inductance of coils shall be measured at the frequency specified. For cylindrical coils, the test procedures of 4.7.3.1.1 and 4.7.3.1.2 shall be used.

When true inductance is specified (see 3.1), the following test procedure, or equivalent, shall be used. A calibrated capacitor shall be used to tune the winding to resonance at several frequencies. The points shall describe a straight line of added capacitance, one point of which shall be $\frac{1}{f_o^2}$, as abscissa, versus the reciprocal of the frequency squared, as ordinate, to be plotted, and true inductance to be calculated by the following formula:

$$\text{True inductance} = KM$$

Where: $K = \frac{1}{4\pi^2} = 0.0253$

M = Slope of line representing added capacitance.
fo = Self-resonant frequency of the coil at the abscissa of zero capacity.

4.7.3.1.1 Effective inductance for cylindrical coils (inductance 0.10 to 10.0 microhenries, inclusive). The tests shall be performed using a meter such as Hewlett Packard model 260A, HP4342A, HP250RX, or equivalent at appropriate test frequencies as listed in the instructions for the test equipment. Suitable means shall be used to calibrate the frequency dial of the Q meter within ±0.1 percent for the applicable test frequency. Frequencies to be used for testing the various ranges of inductance shall be as follows:

Inductance range, µH	Reference test frequency (MHz) for 260A
0.10 to 1.0 inclusive	25.0
Above 1.0 to 10.0 inclusive	7.9

Allowance shall be made for the internal inductance of the meter and the test fixture as determined in 4.7.3.1.1.1.

4.7.3.1.1.1 Effective inductance. Effective inductance shall be determined as follows when using test fixture TF-A or TF-B, as applicable, on figures 1 or 2. The appropriate test fixture shall be inserted in the Q meter coil terminals with the side showing the test fixture letter facing the capacitance terminals. The appropriate shorting bar conforming to figures 3 or 4 shall be inserted in the clips of the test fixture in such a manner that the terminals rest firmly against the stops, and so that the bar is centered between the test fixture terminals. The Q meter capacitance dial shall be set at 400 picofarads (pF) and the vernier capacitance dial at zero. The Q meter shall then be resonated using the frequency dial until a peak reading is obtained. The frequency shall be monitored in order to obtain an accuracy of 0.1 percent. This resonant frequency value in megahertz (MHz) shall be recorded.

The main capacitance dial shall be calibrated periodically in accordance with a routine calibration program for test equipment. The sum of the residual inductance of the Q meter and the inductance of the test fixture shall be calculated from:

$$L_{cf} = \frac{1}{4\pi^2 f^2 C} - L_{bar}$$

Where:

L_{cf} = inductance in microhenries of the test fixture and residual inductance of the Q meter.
f = frequency in megahertz.
C = capacitance in microfarads.
L_{bar} = calculated inductance in microhenries of the shorting bar as determined from the following formula:

$$L_{bar} = 0.002\ell \left[2.303 \log_{10} \frac{4\ell}{d} - 1 + \frac{d}{2\ell}\right]$$

Where:
ℓ = length of wire (cm).
d = diameter of cross section (cm).

The shorting bar shall then be removed from the test fixture and the Q meter frequency shall be set to the frequencies specified in 4.7.3.1.1. The coil under test shall then be inserted in the test fixture in such a manner that the leads are straight and rest firmly against the stops, and so that the unit is centered between the test fixture terminals. The L-C dial of the Q meter shall then be turned until the resonance meter indicates a peak reading. The inductance (L_d) shall be read directly on the L-C dial, using the inductance scale and the effective inductance (see 3.1) of the coil calculated from the formula:

$$L = L_d - L_{cf}$$

Where:

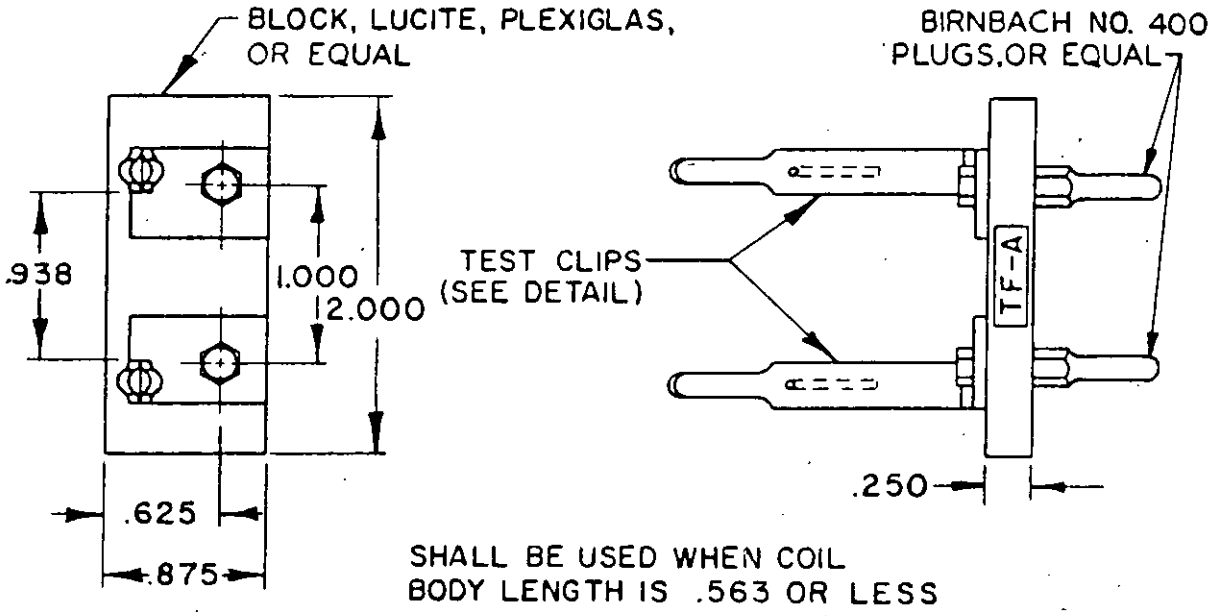
L = effective inductance in microhenries of coils.
Ld = inductance dial reading in microhenries.
L_{cf} = correction factor for inductance of test fixture and residual inductance of the Q meter in microhenries.

4.7.3.1.2 Effective inductance for cylindrical coils (inductance greater than 10 microhenries). Test as specified in 4.7.3.1.1, except that no allowance is made for residual inductance of Q meter and inductance of test fixture. Frequencies to be used for testing various ranges of inductance shall be as follows:

Inductance range, µH	Reference test frequency (MHz) for 260A
Above 10.0 to 100.0 inclusive	2.5
Above 100.0 to 1,000.0 inclusive	0.790
Above 1,000.0 to 10,000.0 inclusive	0.250
Above 10,000.0 to 100,000.0 inclusive	0.079

4.7.3.1.3 Effective inductance for radial lead coils (inductance 0.10 to 10.0 microhenries, inclusive). The test shall be performed as specified in 4.7.3.1.1.1, except that test fixtures TF-C, TF-D, or TF-E on figure 5, shall be used. The shorting bar for use with these test fixtures shall be made of AWG size No. 18 solid copper wire approximately 1-1/4 inches long, and shall be bent as required.

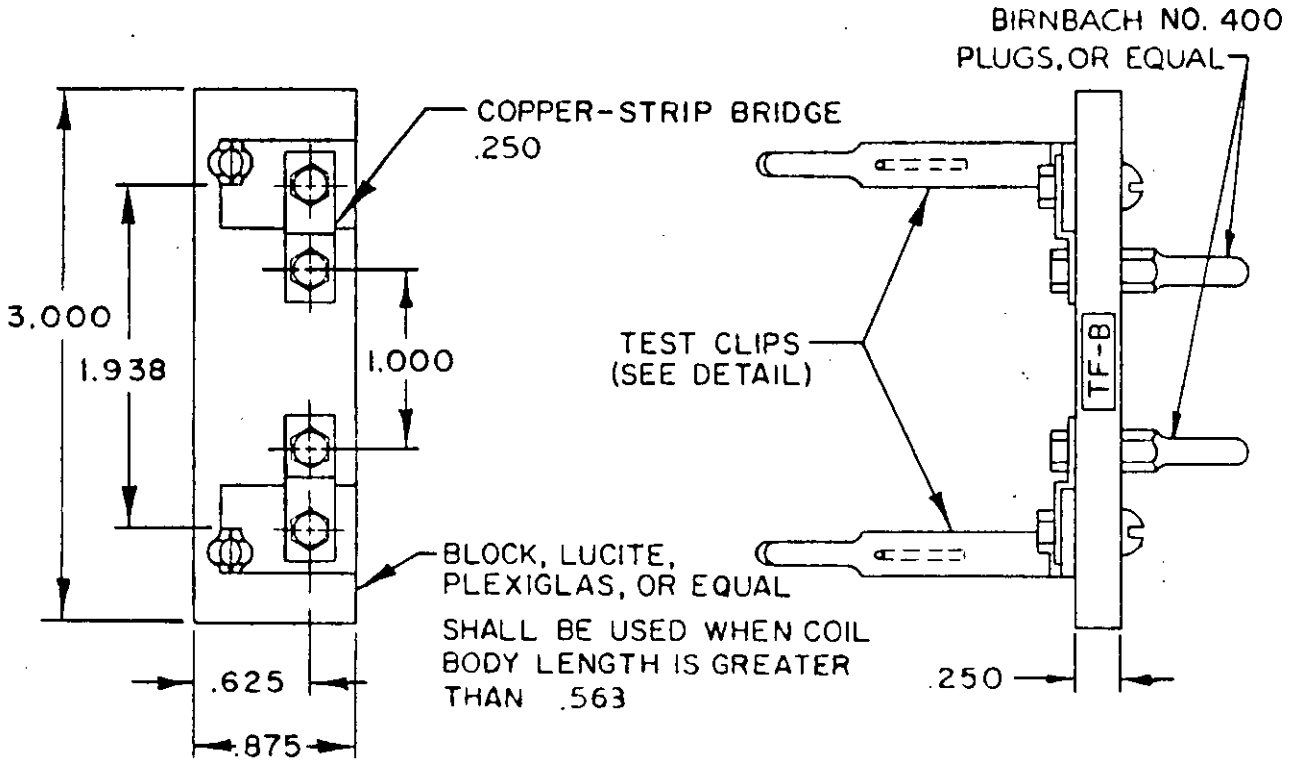
4.7.3.1.3.1 Effective inductance for radial lead coils (inductance greater than 10 microhenries). The test shall be performed as specified in 4.7.3.1.2.



INCHES	MM
.250	6.35
.625	15.88
.875	22.23
.938	23.83
1.000	25.40
2.000	50.80

NOTES:
1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is ±.005 (0.13 mm).
3. Letters in blocks to be marked on fixture.
4. Metric equivalents are given for general information only.

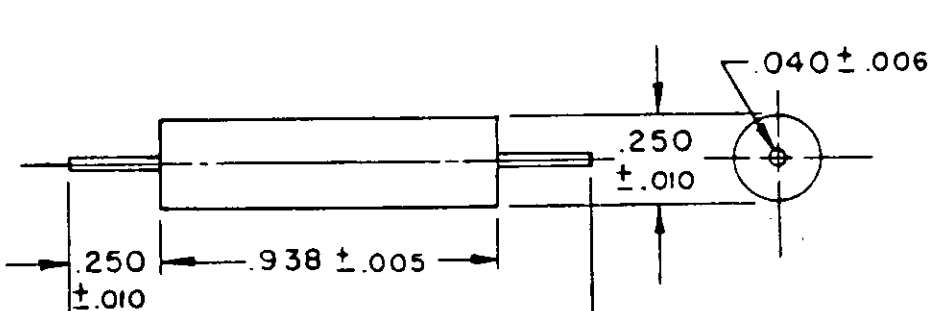
FIGURE 1. Test fixture TF-A (for axial leads) or equivalent.



INCHES	MM
.250	6.35
.563	14.30
.625	15.88
.875	22.23
1.000	25.40
1.938	49.23
3.000	76.20

NOTES:
1. Dimensions are in inches.
2. Letters in blocks to be marked on fixture.
3. Unless otherwise specified, tolerance is ±.005 (0.13 mm).
4. Metric equivalents are given for general information only.

FIGURE 2. Test fixture TF-B (for axial leads) or equivalent.

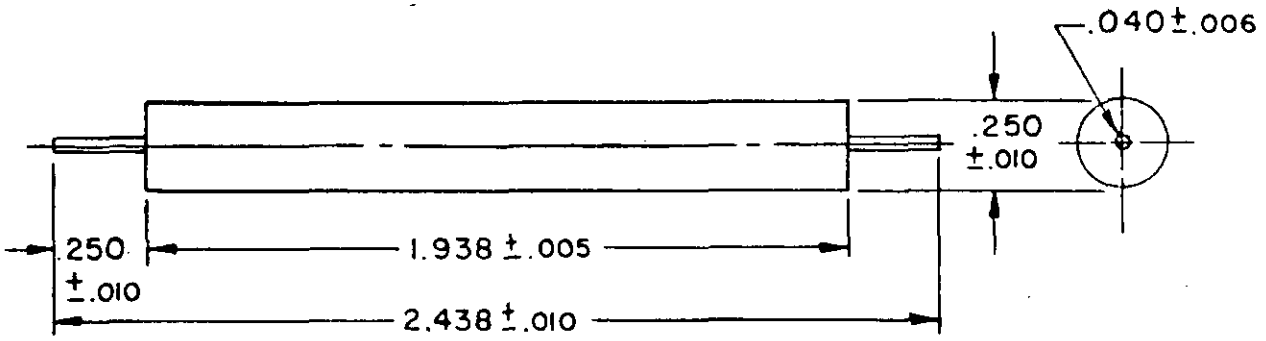


COPPER OR BRASS

INCHES	MM
.005	0.13
.006	0.15
.010	0.25
.040	1.02
.250	6.35
.938	23.83
1.438	36.53

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 3. Shorting bar for test fixture TF-A (for axial leads).

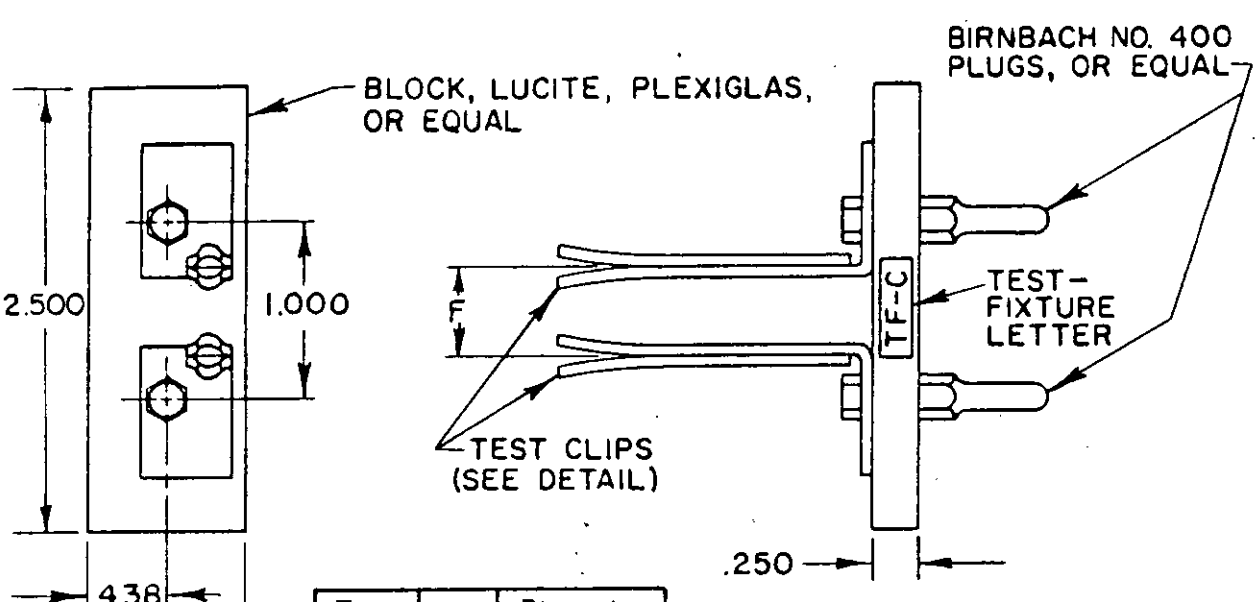


COPPER OR BRASS

INCHES	MM
.005	0.13
.006	0.15
.010	0.25
.040	1.02
.250	6.35
1.938	49.23
2.438	61.93

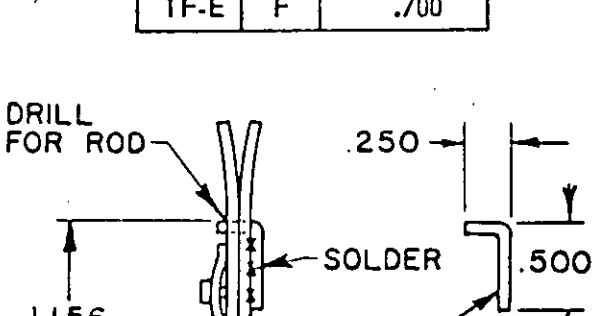
NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 4. Shorting bar for test fixture TF-B (for axial leads).



Test fixture	Dim	Dimensions Inches
TF-C	F	.500
TF-D	F	.600
TF-E	F	.700

INCHES	MM
.063	1.60
.250	6.35
.438	11.13
.500	12.70
.600	15.24
.700	17.78
.875	22.23
1.000	25.40
1.156	29.36
2.500	63.50



RAPID TEST CLIP R OR L OR EQUAL

Detail

NOTES:
1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is ±.005 (0.13 mm).
3. Letters in blocks to be marked on fixture.
4. Metric equivalents are given for general information only.

FIGURE 5. Test fixtures TF-C, TF-D and TF-E (for radial leads) or equivalent.

4.7.3.2 Q of coils. The test shall be performed using a Q meter such as Hewlett Packard model 260A, HP4342A, or equivalent. Suitable means shall be used to calibrate the frequency dial of the Q meter and the Q-standard within ±0.1 percent of the applicable test frequency. Frequencies to be used for testing the various ranges of inductance shall be as specified in 4.7.3.1.1 and 4.7.3.1.2. The appropriate test fixture, as applicable, as shown on figures 1, 2, or 5 shall be assembled to the coil terminals of the Q meter, with the side showing the test fixture letter facing the capacitance terminals. The unit under test shall then be inserted into the test clip in such a manner that the leads are straight and rest firmly against the stops, and so that the unit is centered between the terminals. The Q shall then be read on the Q voltmeter.

4.7.3.3 Self-resonant frequency. Unshielded coils shall be placed in the field of a variable-frequency oscillator, such as Measurements Corporation megacycle meter, model 59, or equivalent. The oscillator shall include a device for indicating the relative amount of power absorbed from the field (e.g., a grid-dip meter). The unit under test shall be placed on the appropriate test fixture shown on figures 7 or 8. Units shall be suspended or supported a minimum of 1-1/2 inches from any surface other than the test fixture supports or oscillator coil. The frequency of the oscillator shall be varied through the frequency range near the self-resonant frequency specified (see 3.1 and 6.1). At any frequency in the frequency range where an abrupt increase in power absorption is indicated, the coupling between the oscillator coil and the unit under test shall be decreased, by increasing the separation between the coils, until a moderate dip in grid current results when tuning to this resonance. This frequency shall be considered the self-resonant frequency of the unit, and shall be accurately determined by suitable means to within ±0.2 percent. A check shall be made for spurious indications due to a resonance not associated with the unit under test, by removing the unit from the field (at frequencies below 2.5 MHz, any suitable method may be used). Coils which cannot be resonated in this manner shall be tested as specified in 4.7.3.3.1. Shielded coils shall be tested in a similar manner, however, when electrostatic shielded coils are tested, the shield of the coil shall be grounded. The following method may be used as an alternate method of measurement of shielded coils (see 3.7.3).

4.7.3.3.1 Alternate test method. When coils under test cannot be resonated by the method specified in 4.7.3.3, the test shall be performed using the instruments specified in 4.7.3.2, or equivalent. The coils shall be mounted in the appropriate test fixture, as applicable, as shown on figures 1, 2, or 5 with the test fixture letter facing the inductance terminals. The tuning capacitor of the Q meter shall then be set to approximately 400 pF, and the Q circuit shall be resonated by adjusting the oscillator frequency of the Q meter. The unit under test shall then be replaced with a shielded comparison coil having an inductance about 1/25 that of the unit under test, or a coil that will resonate in the Q circuit at a frequency about 10 times the initial resonant frequency. The Q meter shall then be set to a frequency approximately 10 times the initial resonant frequency, and the Q circuit shall then be resonated at this new frequency. (This factor of 10 is based on the distributed capacitance of the unit under test being in the region of 4 pF, which is common for small coils. Higher distributed capacitances will lower the resonant frequency of the unit under test, and a factor smaller than 10 will prevail.) The unit under test shall then be connected across the capacitance terminals of the Q meter, taking care to avoid coupling between the unit under test and the comparison coil. The Q circuit shall then be re-resonated by means of the Q-tuning capacitor or the vernier-tuning capacitor, observing whether the capacitance has to be increased or decreased from its previous value, in order to restore resonance. If the capacitance has to be increased, the oscillator frequency shall be increased by 10 to 20 percent. If the capacitance has to be decreased, the oscillator frequency shall be decreased by the same amount. The unit under test shall then be disconnected from the Q meter, and the Q circuit shall be resonated to the new frequency by means of the Q-tuning capacitor. The previous procedure shall then be repeated, while at the same time changing the oscillator frequency by smaller increments as it approaches the resonant frequency of the unit under test, until the frequency reaches a value at which the Q circuit capacitance is unchanged when the unit under test is connected or disconnected. The self-resonant frequency of the unit under test will then be the frequency of the oscillator and shall be accurately determined to within ±0.2 percent (see 3.7.3).

4.7.3.4 Percent coupling. The percent coupling of radio frequency coils, is determined by table VIII.
Two coils with the same dash number shall be placed side by side and in contact with each other. The inductance values are taken of the two coils, first series aiding (L_{T1}) and then series bucking (L_{T2}) at the frequency specified. The ac test voltage shall be the lowest voltage across the coil which will permit the bridge to operate satisfactorily. The percent coupling is then calculated using the following formula:

$$\text{Percent coupling} = \frac{M}{\sqrt{L_1 L_2}} \times 100$$

Where: $M = \frac{L_{T1} - L_{T2}}{4}$ = coefficient of mutual inductance in microhenries (μH)

L_{T1} = Total inductance series aiding (μH)

L_{T2} = Total inductance series bucking (μH)

The inductance values L_1 and L_2 in microhenries are the measured values of the two coils under measurement at the specified frequency in table VIII.

TABLE VIII. Test equipment for percent coupling.

Inductance	Test frequency	Instrument
μH	kHz	
≤1.0	100.0	HP 63H bridge or equal
>1.0 to 100 incl.	10.0	General Radio 1632-A inductance bridge or equal.
>100	1.0	General Radio 1632-A inductance bridge or equal.

Percent coupling test is applicable in qualification inspection, group IB of table IV, electrical characteristics (initial) and group C inspection, subgroup 3 of table VII under electrical characteristics (initial).

4.7.3.4.1 Percent coupling (alternate method). The percent coupling between two radio frequency coils is to be determined by measuring the voltage induced in a coil when a voltage is applied to an adjacent coil. In order to maintain reasonable impedance levels, the measurement is to be performed at 100 kHz for nominal inductances of 10 μH or less, at 10 kHz for nominal inductances less than or equal to 100 μH but greater than 10 μH, and at 1 kHz for inductances greater than 100 μH. The measurement circuit is shown on figure 6.

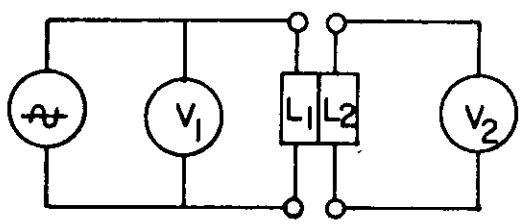


FIGURE 6. Test circuit for percent coupling (alternate method).

Equipment for 1 kHz and 10 kHz consists of Hewlett Packard Model 200 audio oscillator and model 400 vacuum tube voltmeter; for 100 kHz model 606 signal generator and model 400 vacuum tube voltmeter, or equivalent.

The coils to be tested shall be taped or otherwise secured such that the bodies of the coils are kept parallel and in contact with each other to insure maximum coupling. The voltage levels shall be as low as possible to permit reliable readings of V_2. The inductance L should be measured at the same voltage level so that any saturation effects are taken into account.

The percent coupling is to be calculated using the equation:

$$\text{percent coupling} = \sqrt{\frac{L_1}{L_2}}\,\frac{V_2}{V_1} \times 100$$

Where: L_1 = effective inductance of primary coil (measured at test frequency)
L_2 = effective inductance of secondary coil
V_1 = voltage measured across primary
V_2 = voltage measured across secondary

NOTE: This test may also be performed using the Q meter for the oscillator at the standard test frequency allowing simultaneous reading of L_1. Reversing the coils allows reading of L_2 and also a second measurement of coupling for verification or averaging.

The percent coupling is to be calculated using the equation

When $V_1 = .02\ Q$

$$\text{Percent coupling} = 50\,\frac{V_2}{Q}\sqrt{\frac{L_1}{L_2}} \times 100$$

L_1 = effective inductance of primary coil (measured at test frequency)
L_2 = effective inductance of secondary coil
V_2 = voltage measured across secondary
Q = as measured

4.7.3.5 Incremental current inductance change. Incremental current inductance change is the dc current required to cause a change of no more than 5 percent from the inductance measured with zero dc current and the inductance measured with the specified value of incremental current (see 3.1 and 6.2). This test is performed using a General Radio Type 1633-A incremental inductance bridge, or equivalent, at 10 kilohertz (kHz) for inductance values between 10 and 100 microhenries, and 1 kHz for inductance values greater than 100 microhenries, and the General Radio Type 1632-A inductance bridge, or equivalent at 10 kHz for inductance values less than 10 microhenries. The ac test voltage to be used across the coil for bridge operation shall be determined by the following formula:

$$E = f\sqrt{L}$$

where:
E = voltage (rms) in millivolts
f = frequency in kilohertz
L = nominal value of inductance in microhenries

This voltage is to be measured with a suitable voltmeter connected directly across the coil. This voltmeter is disconnected prior to making the inductance measurement. The inductance of the coil under test shall be determined and recorded with zero dc current in the coil. The specified value of incremental current shall be applied through the coil and this inductance measurement recorded. The change in inductance between the two values shall be less than 5 percent.

4.7.3.6 Effective parallel resistance. The test may be performed using a Hewlett Packard Model 260A, HP4342A, HP250RX meter or equivalent test method. The oscillator controls shall be set at the specified measurement frequency followed by the insertion of a suitable work coil attached to the Q meter coil terminals and the capacitor adjusted for resonance. The capacitance dial reading (C_1) and Q dial (Q_1) shall be recorded, also the "multiply Q by" meter dial, when it is other than XI which is preferable. Connect the coil under test to the capacitance terminals and restore resonance by adjusting the capacitor. Record the Q dial reading (Q_2). The effective parallel resistance of the inductor is calculated by the following formula:

$$R_p = \frac{.159\ Q_1\ Q_2}{FC_1\ (Q_1 - Q_2)}$$

Where:

Q_1 = Q of the Q circuit alone.
Q_2 = Q of the Q circuit with the test coil connected to the Q circuit
Rp = effective resistance in kilohms.
F = frequency in megahertz.
C_1 = capacitance in picofarads.

4.7.3.6.1 Effective parallel resistance (alternate method). The test may be performed by direct measurement using a Hewlett Packard Model HP250RX meter for Rp values of 50 kilohms or less.

4.7.3.7 DC resistance. Direct current (dc) resistance of coils shall be measured in accordance with method 303 of MIL-STD-202.

4.7.4 Dielectric withstanding voltage (see 3.8). Coils shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

a. Special preparation or conditions. Cylindrical insulated coils shall be clamped in the trough of a 90 degree metallic V-block using a metallic strap with a 0.075 inch-thick layer of conductive moisture-resistant resilient material, having a resistivity of less than 1,000 ohms per centimeter, shall be bonded to the surface of the strap next to the coils. The body of the coil shall not extend beyond the extremities of the block or resilient material. The surface of the V-block shall be free from contamination. The coil leads shall be so positioned that the distance between the leads and any point of the V-block shall be not less than the radius of the coil and minus the radius of the lead wire. The metallic V-block shall be of noncorrosive material.

b. Magnitude of test voltage. The ac test voltage shall be a minimum of 1,000 volts with a leakage current not to exceed 100 microamperes unless otherwise specified (see 3.1 and 6.2). The time duration shall not exceed 60 seconds.

c. Points of application of test voltage. Unless otherwise specified (see 3.1), the test voltage shall be applied between the leads of the coil connected together and the V-block with block and metal strap at ground potential.

d. Inspection after test. Coils shall be inspected for evidence of damage resulting from arcing, flashover, breakdown of insulation, or other damage.

4.7.5 Barometric pressure when applicable (see 3.9). Coils designed for operation above 10,000 feet shall be tested in accordance with method 105 of MIL-STD-202. The following details and exceptions shall apply:

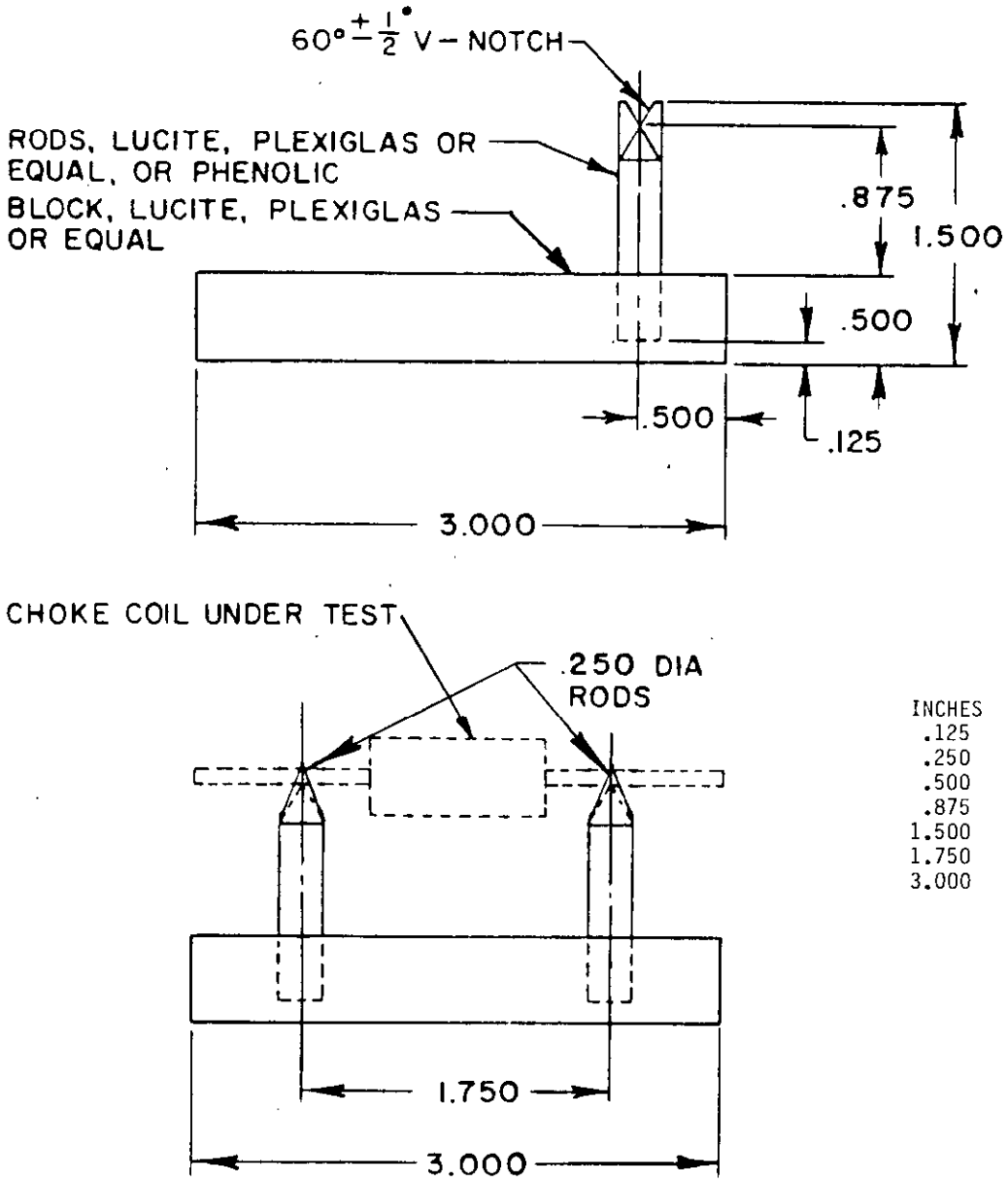
a. Special preparation or conditions. Cylindrical insulated coils shall be clamped in the trough of a 90 degree metallic V-block using a metallic strap with a 0.075 inch-thick layer of conductive moisture-resistant resilient material, having a resistivity of less than 1,000 ohms per centimeter, shall be bonded to the surface of the strap next to the coils. The body of the coil shall not extend beyond the extremities of the block or resilient material. The surface of the V-block shall be free from contamination. The coil leads shall be so positioned that the distance between the leads and any point of the V-block shall be not less than the radius of the coil and minus the radius of the lead wire.

b. Test condition as specified (see 3.1).

c. Test during subjection to reduced pressure. Coils shall be subjected to 60 Hz, ac test voltage at a minimum of 200 volts rms at 70,000 feet unless otherwise specified (see 3.1 and 6.2), for a minimum of 60 seconds.

d. Points of application of test voltage. Unless otherwise specified (see 3.1 and 6.2), the test voltage shall be applied between the leads of the coil connected together and the V-block with block and metal strap at ground potential.

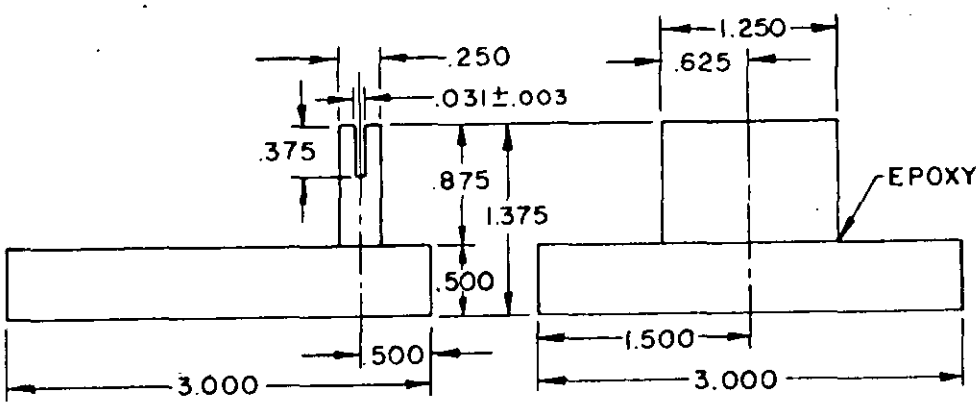
e. Inspection after test. Coils shall be inspected for evidence of damage resulting from arcing, flashover, breakdown of insulation, or other damage.



INCHES	MM
.125	3.18
.250	6.35
.500	12.70
.875	22.23
1.500	38.10
1.750	44.45
3.000	76.20

NOTES:
1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is ±.005 (0.13 mm).
3. Metric equivalents are given for general information only.

FIGURE 7. Test fixture for self-sesonant-frequency test (for axial leads) or equivalent.



INCHES	MM
.003	.08
.031	.79
.250	6.35
.375	9.53
.500	12.70
.625	15.88
.875	22.23
1.250	31.75
1.500	38.10
3.000	76.20

NOTES:
1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is ±.005 (0.13 mm).
3. Letters in blocks to be marked on fixture.
4. Metric equivalents are given for general information only.

FIGURE 8. Test fixture for self-resonant frequency test (for radial leads) or equivalent.

4.7.6 Insulation resistance (see 3.10). Coils shall be tested in accordance with method 302 of MIL-STD-202. The following details and exceptions shall apply:

a. Test condition letter B, except that for coils with a dielectric withstanding test voltage less than 500 volts (see 3.1), test condition letter A shall be used.

b. Points of measurement. Unless otherwise specified (see 3.1), measurements shall be made between insulated points. For cylindrical coils, the measurements shall be made between the coil winding and the metal strap in the coil-connecting assembly specified on figure 9 or between the coil leads connected together and the V-block (see 4.7.5d).

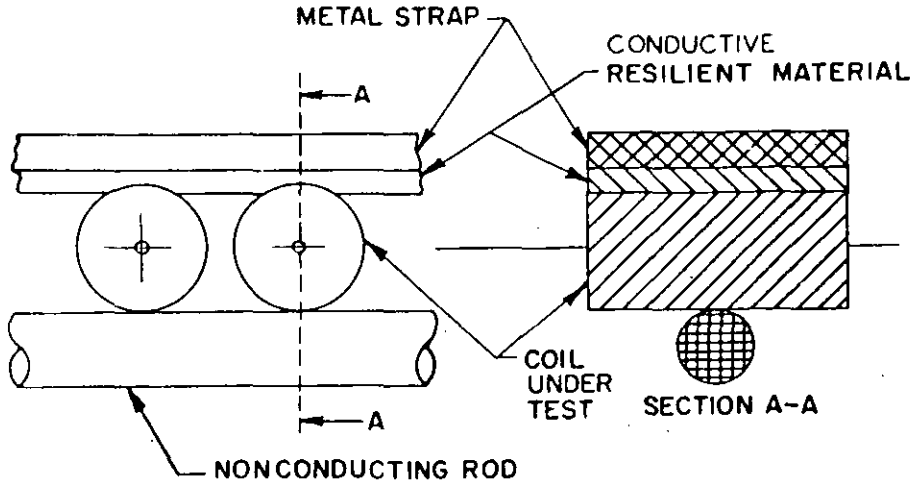
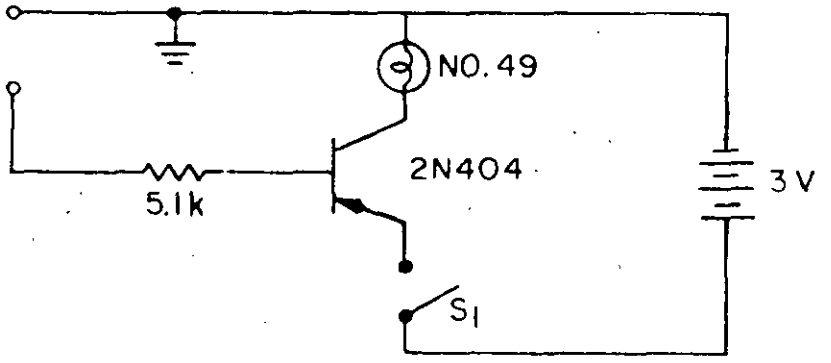


FIGURE 9. Coil contacting assembly for mounting during polarization.

4.7.7 Winding continuity (see 3.11). All windings of coils shall be tested for electrical continuity by any suitable means that will not introduce currents in excess of the rated value, or the incremental current value (when specified see 3.1), whichever is less.

The following test circuit is recommended for ferrite core coils to limit the test current to less than .6 mA.



4.7.8 Temperature rise (see 3.12). The temperature rise of cylindrical coils shall be determined as specified in 4.7.8.1. The temperature rise of the winding of other coils (when specified see 3.1 and 6.2) shall be determined by any suitable method (preferably by the resistance-change method). This test shall be performed at the specified ambient temperature and with rated dc current applied (see 3.1 and 6.2). When the resistance of the winding, measured at 5 minute intervals, remains constant, the temperature of the winding requires the removal of power, the measurement shall be made within 10 seconds after the removal of power.

4.7.8.1 For cylindrical coils. The coil under test shall be connected to a test fixture conforming to figure 10 with each wire lead wrapped one turn around the test fixture terminal and shall be soldered to the terminal for uniform low contact resistance. The test fixture, with the attached coil, shall then be placed in a test chamber which allows forced-air circulation to be shut off during testing. The test chamber shall be free of test-area drafts and direct thermal radiation. A temperature-indicating device with an accuracy of ±0.5° C shall be located in the area surrounding the coil under test, but not where it will be influenced by the temperature rise of the coil. The test chamber temperature shall then be stablized at the specified ambient temperature (see 3.1 and 6.2). The dc resistance (r) shall be measured with one-tenth rated direct current applied at the specified ambient temperature (t). When the resistance of the coil is stabilized, the resistance value shall be recorded. The ammeter-voltmeter method may be used for determining this resistance provided that the accuracy of these meters is ±0.5 percent or better and the resistance of the voltmeter is at least 1,000 ohms per volt. The rated direct current (see 3.1), shall then be applied to the coil under test, using a stable current source such as a storage battery. Forced-air circulation shall be shut off when rated current is applied. When the resistance of the coil under test is stabilized with rated current applied, the resistance (R) and the test chamber temperature (T) shall be recorded. The temperature rise (ΔT) shall be calculated by the following formula:

$$\Delta T = \frac{R - r}{r} (t + 234.5) - (T - t)$$

Where:

ΔT = Temperature rise in °C above the specified ambient temperature of the coil under test.

R = Resistance of coil in ohms with rated direct current applied at temperature $(T + \Delta T)$.

r = Resistance of coil in ohms at temperature (t), the specified ambient temperature.

t = Stabilized specified ambient temperature in °C of the coil under test without dc current applied.

T = Ambient temperature in °C (at time forced-air circulation is shut off) with rated dc current applied. T shall not differ from t by more than 5°C.

4.7.9 Overload (see 3.13). DC current equivalent to 1-1/2 times the specified rated current (see 3.1 and 6.2), shall be applied to the windings for 5 minutes. After the test, coils shall be inspected for evidence of cracked cases, charred windings, distorted or softened insulation, or loosened windings or terminals.

4.7.10 Resistance to soldering heat (see 3.14). Terminals to be used for soldered connections shall be tested in accordance with method 210 of MIL-STD-202. The following details shall apply:

a. Depth of immersion in molten solder. One-fourth inch from the nearest insulating material, or to one-half the exposed length of the terminal, whichever point is closer to the insulating material.

b. Test condition A. After the test and as soon as the soldered terminals have returned to room ambient temperature, the coils shall be inspected for evidence of mechanical damage and loosening of the terminals.

4.7.11 Terminal strength (see 3.15). Coils shall be tested as specified in 4.7.11.1 to 4.7.11.3.1, as applicable.

4.7.11.1 Pull.

4.7.11.1.1 All terminals. Each terminal shall be tested in accordance with method 211 of MIL-STD-202. The following details shall apply:

a. Test condition A.

b. Applied force. Unless otherwise specified (see 3.1), the applied force shall be 5 pounds.

4.7.11.2 Twist.

4.7.11.2.1 Solid wire lead terminals (axial and radial lead terminals, not printed circuit terminals). Each terminal shall be tested in accordance with method 211, test condition D, MIL-STD-202.

4.7.11.3 Torque.

4.7.11.3.1 All other terminals (excluding solid wire, axial, radial, and printed circuit terminals). All other terminals shall be subjected to a torque of 0.25 pound-inch applied in alternating directions in a manner tending to produce rotation of the terminal.

4.7.12 Solderability (see 3.16). Coils shall be tested in accordance with method 208 of MIL-STD-202. (Both leads on each unit shall be tested.)

4.7.13 Resistance to solvents (see 3.17). Coils shall be tested in accordance with method 215 of MIL-STD-202. The following details shall apply:

a. Portion of specimen to be brushed (marked portion of coil).

b. Number of specimens to be tested (see tables IV and VII).

c. Permissible extent of damage to the specimen (see 3.13).

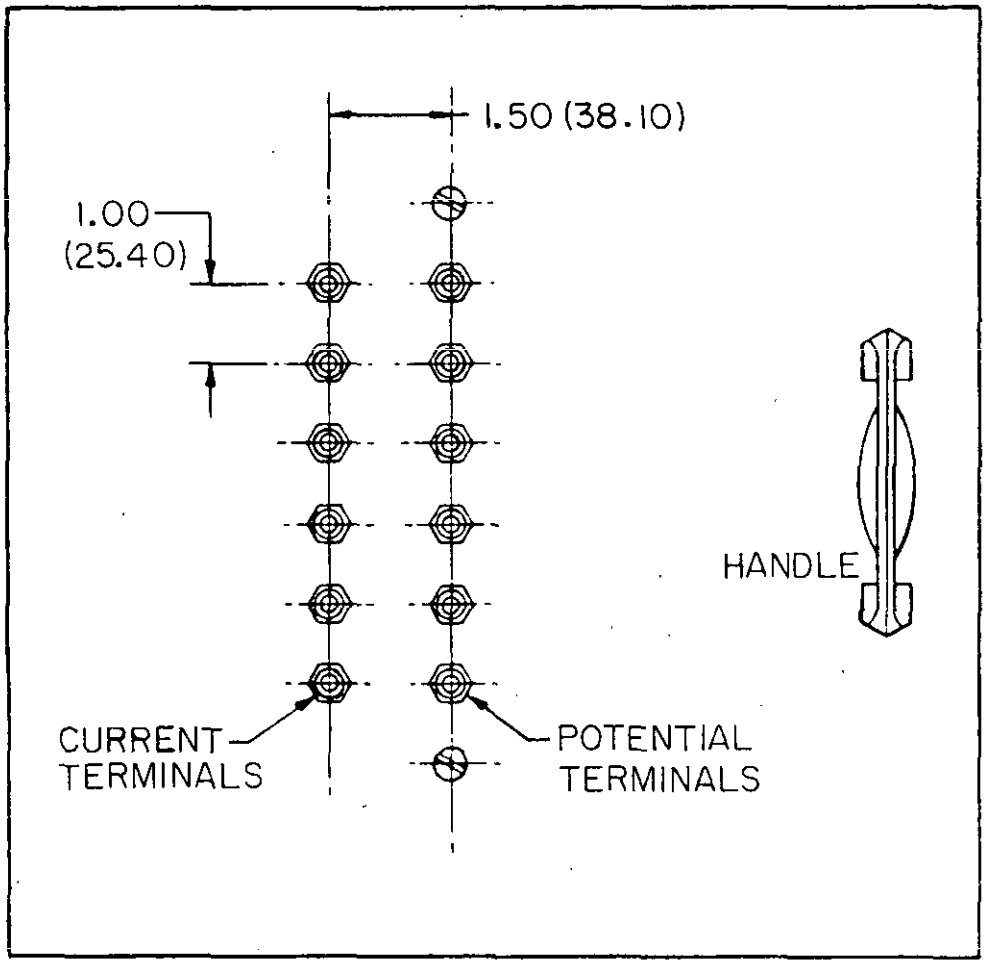
4.7.14 Flammability (see 3.18). Coils shall be tested in accordance with method 111 of MIL-STD-202. The following details and exception shall apply:

a. Point of impingement of applied flame. The flame shall be applied to the body and one end of each coil.

b. Allowable time for burning of visible flame on specimen - 3 minutes maximum.

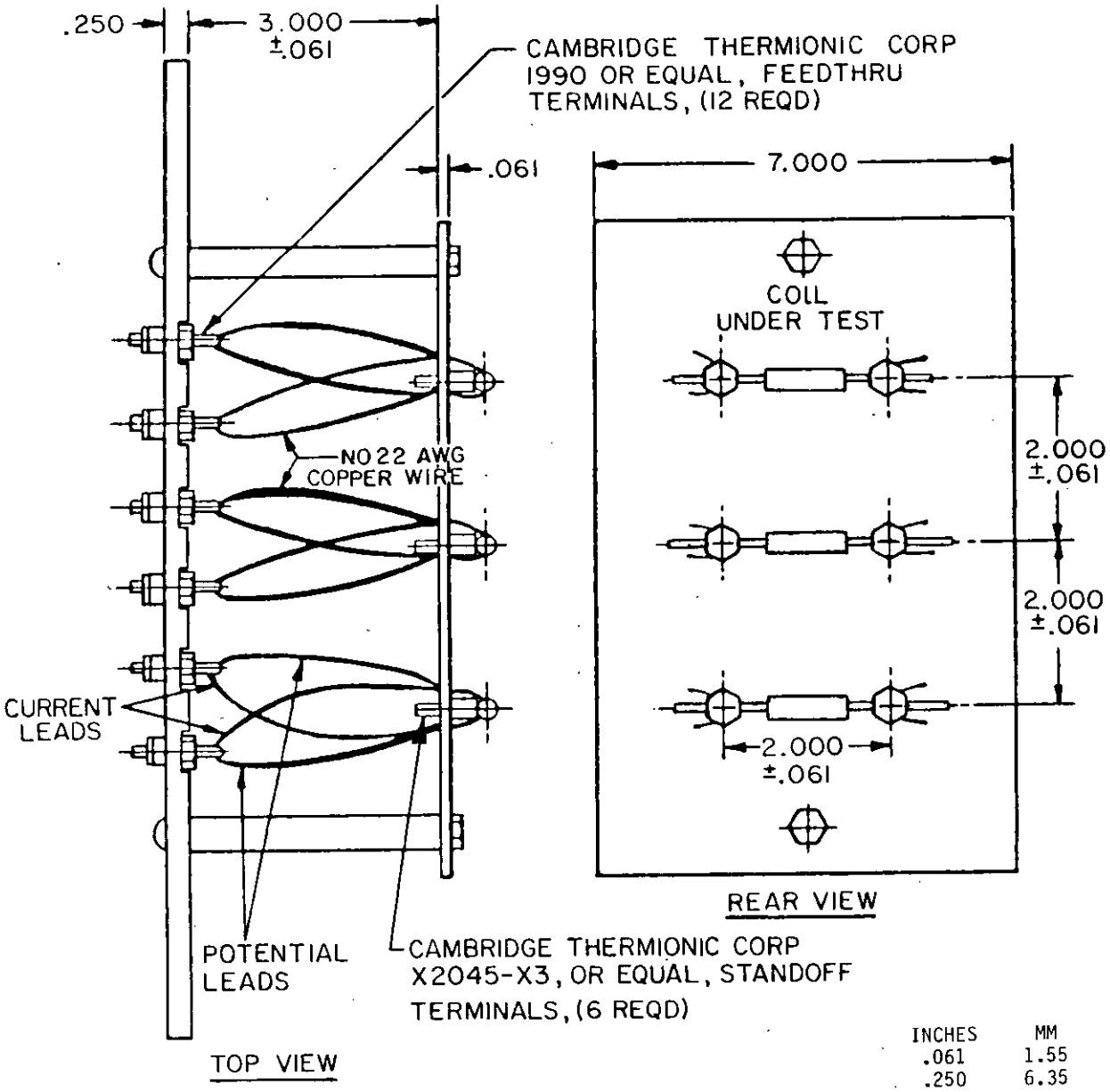
c. Inspection during and after test. Coils shall be inspected for evidence of violent burning which results in an explosive-type fire, dripping of flaming material, and visible burning which continues beyond the allowable duration after removal of the applied flame.

4.7.15 Low temperature storage (see 3.19).



NOTES:
1. *Dimensions are in inches.*
2. Metric equivalents are given for general information only.

FIGURE 10. Test fixture for temperature-rise test on insulated coils or equivalent.



INCHES	MM
.061	1.55
.250	6.35
2.000	50.80
3.000	76.20
7.000	177.80

NOTES:
1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is ±.005 (0.13 mm).
3. Metric equivalents are given for general information only.

FIGURE 10. Test fixture for temperature-rise test on insulated coils or equivalent - Continued.

4.7.15.1 Mounting. Coils shall be mounted by their normal mounting means (see 3.1), in such a manner that there is at least 1 inch (25.4 mm) of free airspace around each coil, and in such a position with respect to the airstream that the mounting offers substantially no obstruction to the flow of air across and around the coil.

4.7.15.2 Procedure. Coils shall be placed in a cold chamber at -63° +0°, -2°C. Ninety-six hours after the coils have reached this temperature, the temperature of the chamber shall be gradually increased to room temperature within a period of not more than 8 hours. Coils shall be inspected for evidence of cracks or other mechanical damage.

4.7.16 Vibration (see 3.20 and 6.2). Coils shall be tested in accordance with 4.7.16.1 or 4.7.16.2. Unless otherwise specified, high frequency vibration in accordance with 4.7.16.1 is applicable.

4.7.16.1 Vibration, high frequency. Coils shall be tested in accordance with method 204 of MIL-STD-202. The following details shall apply:

a. Method of mounting. The coils shall be securely fastened by their normal mounting means (see 3.1 and 6.2). Units which are normally supported by their wire leads shall be mounted and soldered to rigidly-supported terminals, so spaced that the length of each lead is 1/4-inch from the coil body.

b. Test condition D (0.06 inch) double amplitude (maximum total excursion) or 20g, whichever is less, with 10 through 2,000 Hz frequency.

c. Measurement during vibration. Each coil shall be monitored to determine electrical discontinuity by a method which shall at least be sensitive enough to monitor or register, automatically, any electrical discontinuity of 0.1 millisecond or greater duration.

d. Inspection after vibration. Coils shall be inspected for evidence of physical or mechanical damage, and winding continuity shall be tested as specified in 4.7.7.

4.7.16.2 Vibration, low frequency (when specified see 3.1 and 6.2). Coils shall be tested in accordance with method 201 of MIL-STD-202. The following details shall apply:

a. Method of mounting as specified in 4.7.16.1a.

b. Measurement during vibration as specified in 4.7.16.1c.

c. Inspection after vibration as specified in 4.7.16.1d.

4.7.17 Shock (specified pulse) (see 3.21). Coils shall be tested in accordance with method 213 of MIL-STD-202. The following details shall apply:

a. Method of mounting. Coils shall be mounted in relation to the test equipment in such a manner that the stress applied is in the direction which would be considered to be most detrimental. Cylindrical insulation coils shall be soldered to rigidly-supported terminals, so spaced that the length of each lead is 1/4-inch from the coil body.

b. Test condition letter I.

c. Inspection after test. Coils shall be tested for winding continuity as specified in 4.7.7 and inspected for evidence of physical or mechanical damage.

4.7.18 Immersion (see 3.22). Coils shall be tested in accordance with method 104 of MIL-STD-202. The following details shall apply:

a. Test condition B.

b. Measurements after final cycle. Units shall be inspected for evidence of flow of impregnating material from the case, corrosion, or other visible damage, and winding continuity shall be tested as specified in 4.7.7. For quality conformance inspection, the units shall be subjected to the dielectric withstanding voltage test specified in 4.7.4 at 90 percent of the test voltage specified (see 3.1), and to the insulation resistance test specified in 4.7.6.

4.7.19 Moisture resistance (see 3.23). Coils shall be tested in accordance with method 106 of MIL-STD-202. The following details and exceptions shall apply:

a. Mounting on racks. Cylindrical insulated coils shall be soldered by their leads to rigid mounts or terminal lugs. The spacing of the mounts or terminal lugs shall be such that the length of each coil lead is approximately 1/4-inch when measured from the edge of the supporting terminal to the coil body. For polarization (see 3.1 and 6.1), the coils shall be covered with a flat, corrosion-resistant metal strap and the width of the strap is equal to the length of the coils and sufficient thickness to be rigid. A 0.075-inch-thick layer of conductive, moisture-resistant, resilient material, having a resistivity of less than 1,000 ohms-centimeter, shall be bonded to the surface of the strap next to the coils. Sufficient contact pressure shall be maintained by applying a compressive force between the strap and a cylindrical, corrosion-resistant, nonconducting rod held beneath the coils, as shown on figure 9. The mounting strap may be used to cover one or more coils at a time. When units are removed from the humidity chamber, all mounting straps shall be removed to perform step 7a, and shall be replaced prior to returning the coils to the humidity chamber. Step 7b shall not be applicable.

b. Polarization. Unless otherwise specified (see 3.1), during steps 1 to 6 inclusive, a polarizing voltage of 100 volts dc shall be applied. The voltage shall be positive with respect to the mounting strap. For other type coils and units having no mounting hardware, the polarizing voltage shall be applied as specified (see 3.1).

c. Final measurements. Following the 1-1/2 to 3-1/2-hour conditioning period, unless otherwise specified (see 3.1 and 6.1), the units shall be removed to room ambient conditions. Within 30 minutes after removal, the dielectric withstanding voltage test specified in 4.7.4 shall be performed at 90 percent of the test voltage specified (see 3.1) and the insulation resistance test shall be performed in accordance with 4.7.6. Within 1 hour after these measurements, the specified electrical characteristics (see 3.1), shall be measured as specified in 4.7.3. After the test, units shall be inspected for evidence of corrosion.

4.7.20 Life (see 3.24). Coils shall be tested in accordance with method 108 of MIL-STD-202. The following details and exceptions shall apply:

a. Method of mounting:

(1) Wire-lead terminal coils shall be supported by wire leads mounted by lightweight push-post terminals on each side of the body. The effective length of each terminal shall be 1/2 inch minimum. The panel racks or breadboarding device shall be equipped with current sensing terminals. Coils shall be so arranged that the temperature of any one coil shall not appreciably influence the temperature of any other coil.

(2) All other terminals shall be supported as specified (see 3.1). Coils shall be so arranged that the temperature of any one coil shall not appreciably influence the temperature of any other coil.

b. Ambient test temperature and tolerances unless otherwise specified:

(1) Phenolic core coils: 90 ±2°C.

(2) Iron core coils: 90 ±2°C.

(3) Ferrite core coils: 90 ±2°C.

(4) Other core coils: As specified (see 3.1).

c. Operating conditions. 100 percent rated cyclic loaded conditions (see 3.1), 1-1/2 hours on and 1/2-hour off, for the applicable number of hours specified and at the ambient test temperatures. "On time" shall be three-fourths of the total lapsed time.

d. Initial measurements. Measurements of inductance, Q, dc resistance, and self-resonant frequency shall be performed at room temperature prior to subjecting the coils to the specified test temperature. These initial measurements shall be used as reference in determining degradation limits after exposure of the test temperature after each of the specified test intervals.

e. Test conditions: 2,000 hours elapsed time for qualification inspection with all samples continued to 10,000 hours. 10,000 hours for group C failure rate level inspection.

f. Measurements during test:

(1) Qualification inspection. Measurements of inductance, Q, dc resistance and self-resonant frequency shall be made after 250 +48-0 hours, 500 +48-0, 1,000 +48-0, 2,000 +72-0 hours have elapsed. The coils shall be stabilized at room temperature for a minimum of 1/2 hour after removal from the test chamber prior to taking measurements. Coils shall remain at room temperature for no greater period of time than necessary to perform the required measurements before return to test chamber.

(2) Extended life test. Coils shall be tested for a period of 10,000 +96-0 hours. Inductance and Q shall be measured at the following intervals: 250 +48-0 hours, 500 +48,0, 1,000 +48-0, and 2,000 +72-0 hours and every 2,000 +72-0 hours thereafter. Final measurements after exposure shall include dc resistance and self-resonant frequency (see 3.1).

g. Inspection after test. Coils shall be inspected for evidence of mechanical damage.

4.7.21 Fungus (see 3.25). Unless certification is provided, coils shall be tested in accordance with method 508 of MIL-STD-810.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or industrial, as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Cleaning. Coils shall be cleaned in accordance with MIL-P-116, process C-1.

5.1.1.2 Drying. Coils shall be dried in accordance with MIL-P-116.

5.1.1.3 Preservative application. Preservatives shall not be used.

5.1.1.4 Unit packs. Each coil shall be individually unit packed in accordance with MIL-P-116, submethod IA-8, insuring compliance with the applicable requirements of that specification.

5.1.1.5 Intermediate packs. Coils, packaged as specified in 5.1.1.4, shall be placed in intermediate containers conforming to PPP-B-566 or PPP-B-676. Intermediate containers shall be uniform in size, shape and quantities, shall be of minimum tare and cube and shall contain multiples of five unit packs, not to exceed 100 unit packs. No intermediate packs are required when the total quantity shipped to a single destination is less than 100 unit packs.

5.1.2 Industrial. The industrial preservation of coils shall be in accordance with MIL-STD-1188.

5.2 Packing. Packing shall be level A, B or industrial, as specified (see 6.2).

5.2.1 Level A. The packaged coils shall be packed in fiberboard containers conforming to PPP-B-636, class weather resistant, style optional, special requirements. The requirements for box closure, waterproofing and reinforcing shall be in accordance with method V of the PPP-B-636 appendix.

5.2.2 Level B. The packed coils shall be packed in fiberboard containers conforming to PPP-B-636, class domestic, style optional, special requirements. Closures shall be in accordance with the appendix thereto.

5.2.3 Industrial. The packaged coils shall be packed in accordance with the requirements of MIL-STD-1188.

5.3 Marking. In addition to any special or other identification marking required by the contract (see 6.2), each unit pack, intermediate and exterior container shall be marked in accordance with MIL-STD-129.

5.4 General.

5.4.1 Exterior containers. Exterior containers (see 5.2.1, 5.2.2 and 5.2.3) shall be of a minimum tare and cube consistent with the protection required and shall contain equal quantities of identical stock numbered items to the greatest extent practicable.

5.4.2 Packaging inspection. The inspection of these packaging requirements shall be in accordance with 4.6.3.

5.4.3 Army acquisitions.

5.4.3.1 Level A intermediate packs. All intermediate containers shall be either weather (or water) resistant or overwrapped with waterproof barrier materials (see 5.1.1.5).

5.4.3.2 Level A and level B packing. For level A packing, the fiberboard containers shall not be banded but shall be placed in a close fitting box conforming to PPP-B-601, overseas type; PPP-B-621, class 2, style 4 or PPP-B-585, class 3, style 2 or 3. Closure and strapping shall be in accordance with applicable container specification except that metal strapping shall conform to QQ-S-781, type I, finish A. When the gross weight exceeds 200 pounds or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids (laid flat) shall be applied in accordance with the requirements of the container specification. If not described in the container specification, the skids shall be applied in a manner which will adequately support the item and facilitate the use of material handling equipment. For level B packing, fiberboard boxes shall be weather resistant as specified in level A and the containers shall be banded (see 5.2.1 and 5.2.2).

6. NOTES

6.1 Intended Use. These radio frequency coils are designed for use in radio frequency circuits where the need for resistant to immersion and moisture, reliability, long life, and continuity of operation are necessary.

6.2 Ordering date. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Title, number, and date of the applicable specification sheet, and the complete part number.

c. Inspection of industrial packaging (see 4.6.3).

d. Levels of preservation and packing required (see 5.1 and 5.2).

e. If special or other identification marking is required (see 5.3).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in qualified products list whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the US Army Electronics Research and Development Command, ATTN: DELET-R-S, Fort Monmouth, NJ 07703; however, information pertaining to qualification of products may be obtained from Defense Electronics Supply Center (DESC-E), Dayton, OH 45444.

6.4 Flammability (self-extinguishing material). Material may be considered self-extinguishing if the following conditions are met:

a. The duration of visible flame does not exceed 3 minutes after removal of the applied flame.

b. There is no explosion, nor any violent burning which results in an explosive-type flame.

c. There is no dripping of flaming material from the transformer under test.

6.5 Final electrical characteristics. The degradation limits specified for the final electrical characteristics, should remain the same for tighter inductance tolerances.

6.6 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - ER
Navy - EC
Air Force - 85

Review activities:
Army - AR, MI
Navy - OS, SH
Air Force - 11, 17, 99
DLA - ES

User activities:
Army - ME
Navy - AS, CG, MC, SH
Air Force - 19

Agent:
DLA-ES

Preparing activity:
Army - ER

(Project 5950-0603)

APPENDIX

PROCEDURE FOR QUALIFICATION INSPECTION

10. SCOPE

10.1 Scope. This appendix details the procedure for submission of samples, with related data, for qualification inspection of coils covered by this specification. The procedure for extending qualification of the required sample to other coils covered by this specification is also outlined herein. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

20. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30. SUBMISSION

30.1 Sample.

30.1.1 Single-type submission. A sample consisting of 151 sample units of each core material, class and individual inductance value for which qualification is sought shall be submitted. Ten additional sample units shall be submitted for the fungus test if certification is not provided.

30.1.2 Combined-type submission. A sample consisting of 152 sample units for each class covered by a single specification sheet for which qualification is sought shall be submitted. All sample units except group III units shall be submitted to the tests of groups IA and IB. Twenty sample units, ten of the lowest inductance value and ten of the highest inductance value, shall be submitted to the tests of group II. Ten sample units of any inductance value shall be submitted to the tests of group III as specified in table IV. Twenty sample units, ten of the lowest inductance value and ten of the highest inductance value shall be submitted to the tests of group IV. One hundred and two sample units, 51 of the lowest inductance value and 51 of the highest inductance value shall be submitted to the test of group V. Ten additional sample units of any inductance value shall be submitted for the fungus test if certification is not provided.

30.2 Qualification to tighter inductance tolerances. Twenty sample units shall be tested, (ten of the lowest inductance value and ten of the highest inductance value of the specified inductance tolerance), for each class covered by a single specification sheet. They shall be submitted to the tests of group IA and visual and mechanical inspection of group IB of table IV.

40. EXTENT OF QUALIFICATION

40.1 Single-type. Qualification shall be restricted to the single M part number submitted.

40.2 Combined-type submission. Qualification shall be restricted to all of the inductance values covered on a single specification sheet between the values passing qualification inspection.

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document*(s)* or to amend contractual requirements.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-C-39010C	Coils, Fixed Radiofrequency, Molded, Established Reliability

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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